

1. A method of enhancing an image, comprising:
smoothing the image to produce a smoothed image; and
performing lowpass filtering on the smoothed image to
produce an enhanced image.

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2. The method of claim 1, wherein smoothing comprises:
applying a two-dimensional filter to a pixel in the
image;

storing a pixel processed by the two-dimensional filter
in the smoothed image; and

repeating storing and applying for one or more other
pixels in the image.

3. The method of claim 1, wherein performing lowpass
filtering comprises:

applying a one-dimensional filter to a pixel in the
smoothed image;

storing a pixel processed by the one-dimensional filter
in the enhanced image; and

repeating storing and applying for one or more other
pixels in the smoothed image.

4. The method of claim 1, wherein lowpass filtering is performed using a filter having a sharp high-frequency cutoff.

5 5. The method of claim 1, further comprising detecting an edge in the smoothed image;

wherein lowpass filtering is performed only on non-edge areas of the smoothed image.

10 6. The method of claim 5, wherein detecting the edge comprises applying an edge filter to the smoothed image.

7. The method of claim 1, further comprising applying a median filter to the enhanced image;

15 wherein the median filter is designed to reduce artifacts on the enhanced image.

8. The method of claim 7, wherein the median filter is applied only to non-edge areas of the enhanced image.

20 9. A method of performing inverse halftoning on a halftoned image, comprising:

smoothing the halftoned image using a two-dimensional filter to produce a smoothed image;

detecting edge areas in the smoothed image;
performing lowpass filtering on non-edge areas of the
smoothed image; and
generating an enhanced image comprised of the edge areas
5 of the smoothed image and lowpass-filtered non-edge areas of
the smoothed image.

10. The method of claim 9, further comprising applying a
median filter to non-edge areas of the enhanced image;

10 wherein the median filter is designed to reduce artifacts
in the enhanced image.

11. An article comprising a machine-readable medium that
stores machine-executable instructions for enhancing an image,
15 the instructions causing a machine to:

smooth the image to produce a smoothed image; and
perform lowpass filtering on the smoothed image to
produce an enhanced image.

20 12. The article of claim 11, wherein smoothing
comprises:

applying a two-dimensional filter to a pixel in the
image;

storing a pixel processed by the two-dimensional filter
in the smoothed image; and

repeating storing and applying for one or more other
pixels in the image.

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13. The article of claim 11, wherein performing lowpass
filtering comprises:

applying a one-dimensional filter to a pixel in the
smoothed image;

10 storing a pixel processed by the one-dimensional filter
in the enhanced image; and

repeating storing and applying for one or more other
pixels in the smoothed image.

15 14. The article of claim 11, wherein lowpass filtering
is performed using a filter having a sharp high-frequency
cutoff.

20 15. The article of claim 11, further comprising
instructions that cause the machine to detect an edge in the
smoothed image;

wherein lowpass filtering is performed only on non-edge
areas of the smoothed image.

16. The article of claim 15, wherein detecting the edge comprises applying an edge filter to the smoothed image.

5 17. The article of claim 11, further comprising instructions that cause the machine to apply a median filter to the enhanced image;

wherein the median filter is designed to reduce artifacts on the enhanced image.

10 18. The article of claim 17, wherein the median filter is applied only to non-edge areas of the enhanced image.

15 19. An article comprising a machine-readable medium that stores machine-executable instructions for performing inverse halftoning on a halftoned image, the instructions causing a machine to:

smooth the halftoned image using a two-dimensional filter to produce a smoothed image;

20 detect edge areas in the smoothed image;

perform lowpass filtering on non-edge areas of the smoothed image; and

generate an enhanced image comprised of the edge areas of the smoothed image and lowpass-filtered non-edge areas of the smoothed image.

5 20. The article of claim 19, further comprising instructions that cause the machine to apply a median filter to non-edge areas of the enhanced image;

 wherein the median filter is designed to reduce artifacts in the enhanced image.

10 21. An apparatus for enhancing an image, comprising:
a memory that stores executable instructions; and
a processor that executes the instructions to:

15 smooth the image to produce a smoothed image; and
 perform lowpass filtering on the smoothed image to produce an enhanced image.

22. The apparatus of claim 21, wherein smoothing comprises:

20 applying a two-dimensional filter to a pixel in the image;

 storing a pixel processed by the two-dimensional filter in the smoothed image; and

repeating storing and applying for one or more other pixels in the image.

23. The apparatus of claim 21, wherein performing

5 lowpass filtering comprises:

applying a one-dimensional filter to a pixel in the smoothed image;

storing a pixel processed by the one-dimensional filter in the enhanced image; and

10 repeating storing and applying for one or more other pixels in the smoothed image.

24. The apparatus of claim 21, wherein lowpass filtering is performed using a filter having a sharp high-frequency
15 cutoff.

25. The apparatus of claim 21, wherein:

the processor executes instructions to detect an edge in the smoothed image; and

20 lowpass filtering is performed only on non-edge areas of the smoothed image.

26. The apparatus of claim 25, wherein detecting the edge comprises applying an edge filter to the smoothed image.

27. The apparatus of claim 21, wherein:

5 the processor executes instructions to apply a median filter to the enhanced image; and

the median filter is designed to reduce artifacts on the enhanced image.

10 28. The apparatus of claim 27, wherein the median filter is applied only to non-edge areas of the enhanced image.

29. An apparatus for performing inverse halftoning on a halftoned image, comprising:

15 a memory that stores executable instructions; and

a processor that executes the instructions to:

smooth the halftoned image using a two-dimensional filter to produce a smoothed image;

detect edge areas in the smoothed image;

20 perform lowpass filtering on non-edge areas of the smoothed image; and

generate an enhanced image comprised of the edge areas of the smoothed image and lowpass-filtered non-edge areas of the smoothed image.

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30. The apparatus of claim 29, wherein
the processor executes instructions to apply a median filter to non-edge areas of the enhanced image; and
the median filter is designed to reduce artifacts in the enhanced image.

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